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AUTHOR Begle, E. G.  
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## ABSTRACT

Described is the development of a test of inductive reasoning for fifth graders by Max Jerman. Nine test items were selected from the French Kit on the basis of pretest statistics; each item has eight parts. Appendices to the brief description include item and scale statistics and a matrix of correlations between scales and total score. (SD)

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SMESG RESEARCH AND ANALYSIS SECTION

Working Paper No. 3

By: E. G. Begle

Subject: Inductive Reasoning Test for Grade Five

As part of his dissertation project, Max Jerman tried to construct an inductive reasoning test that would be suitable for fifth grade students. He started by administering both forms of the French Kit Test "Figure Classification" to a group of fifth graders. The directions given these students were precisely those in the French Kit; however, it was made clear to the students that they were not expected to complete either part by telling them to do as many as they could in the allotted time.

Item and scale statistics were computed, including percent not tried and correlations between items and total score. On the basis of these statistics, nine items were selected as being appropriate for fifth grade students. These items are reproduced in Appendix A.

The location of these items in the French Kit is as follows:

<u>Jerman No.</u>	<u>French Kit Location</u>
1	Form 1, Item 3
2	Form 1, Item 4
3	Form 1, Item 5
4	Form 2, Item 3
5	Form 2, Item 6
6	Form 1, Item 6
7	Form 2, Item 7
8	Form 1, Item 7
9	Form 2, Item 5

It will be noted that each item consists of three exemplars of a particular concept and three non-exemplars, followed by eight figures, each of which was to be labeled either as an exemplar or as a non-exemplar of the concept, the total number of responses thereby being 72.

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These nine items were administered in the fall of 1970 to approximately 300 fifth grade students. The eight responses for each item were treated as an eight-item scale. Summary statistics for these nine scales are shown in Appendix B. It will be noted that scale statistics for all items except No. 4 are quite satisfactory.

Intercorrelations between these scales and also the total 72-response test are shown in Appendix C.

With item 4 omitted, the remaining eight items seem to constitute a statistically satisfactory test of inductive reasoning for fifth grade students.

A closer inspection, however, of the correlation matrix in Appendix C indicates that the first three items cluster together, as do the last five. It is suggested that in any future use of this instrument all eight scales ( 64 responses) be used, and both the total score and a score based on the last forty responses be computed and compared. It may be that the latter score will turn out to be more useful but, if so, the entire eight scales should probably be administered in all cases, with the first three considered as a warm-up.

APPENDIX A PAGES 1-4 REMOVED  
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APPENDIX B  
Item and Scale Statistics

ITEM 1

SCALE STATISTICS:

NUMBER OF CASES = 280  
NUMBER OF VARIABLES = 8  
MEAN TOTAL SCORE = 6.162  
STANDARD DEVIATION = 2.119  
CROBACH'S ALPHA = 0.765  
ERROR OF MEASUREMENT = 0.959

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
1	0.904	0.824	0.641	2.500
2	0.825	0.843	0.766	2.143
3	0.579	0.600	0.642	3.571
4	0.773	0.804	0.887	3.214
5	0.821	0.455	0.536	3.929
6	0.777	0.770	0.687	3.929
7	0.811	0.828	0.864	3.214
8	0.811	0.512	0.679	5.000

ITEM 2

SCALE STATISTICS:

NUMBER OF CASES = 280  
NUMBER OF VARIABLES = 8  
MEAN TOTAL SCORE = 4.336  
STANDARD DEVIATION = 1.990  
CROBACH'S ALPHA = 0.770  
ERROR OF MEASUREMENT = 0.936

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
9	0.871	0.884	0.916	2.500
10	0.629	0.669	0.482	6.071
11	0.800	0.830	0.584	3.571
12	0.821	0.881	0.380	4.643
13	0.861	0.889	0.886	3.214
14	0.871	0.907	0.842	3.929
15	0.800	0.836	0.710	4.286
16	0.682	0.713	0.526	4.286

## ITEM 3

## SCALE STATISTICS:

NUMBER OF CASES = 230  
 NUMBER OF VARIABLES = 8  
 MEAN TOTAL SCORE = 5.750  
 STANDARD DEVIATION = 2.265  
 CROBACH'S ALPHA = 0.724  
 ERROR OF MEASUREMENT = 1.052

## ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
17	0.700	0.775	0.601	9.642
19	0.721	0.752	0.740	8.571
10	0.689	0.766	0.593	10.000
20	0.689	0.757	0.560	8.929
21	0.743	0.816	0.691	8.929
22	0.770	0.849	0.861	9.214
23	0.714	0.781	0.590	8.571
24	0.714	0.806	0.607	11.429

## ITEM 4

## SCALE STATISTICS:

NUMBER OF CASES = 290  
 NUMBER OF VARIABLES = 8  
 MEAN TOTAL SCORE = 4.532  
 STANDARD DEVIATION = 1.658  
 CROBACH'S ALPHA = 0.415  
 ERROR OF MEASUREMENT = 1.253

## ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
25	0.839	0.983	0.403	5.000
26	0.407	0.432	0.213	5.714
27	0.482	0.511	0.292	5.714
28	0.604	0.449	0.182	6.786
29	0.600	0.546	0.249	7.143
30	0.675	0.727	0.297	7.143
31	0.686	0.733	0.392	6.429
32	0.300	0.326	-0.105	7.500

## ITEM5

## SCALE STATISTICS:

NUMBER OF CASES = 280  
 NUMBER OF VARIABLES = 9  
 MEAN TOTAL SCORE = 5.457  
 STANDARD DEVIATION = 2.102  
 CROSBACH'S ALPHA = 0.726  
 ERROR OF MEASUREMENT = 1.180

## ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
32	0.704	0.782	0.712	10.000
34	0.636	0.715	0.449	11.071
35	0.864	0.943	0.947	8.920
36	0.557	0.617	0.405	9.643
37	0.475	0.520	0.458	10.357
38	0.700	0.772	0.456	9.286
39	0.471	0.743	0.472	9.643
40	0.850	0.941	0.877	9.643

## ITEM6

## SCALE STATISTICS:

NUMBER OF CASES = 280  
 NUMBER OF VARIABLES = 9  
 MEAN TOTAL SCORE = 3.771  
 STANDARD DEVIATION = 2.164  
 CROSBACH'S ALPHA = 0.710  
 ERROR OF MEASUREMENT = 1.165

## ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
41	0.132	0.160	0.292	17.500
42	0.621	0.744	0.594	16.429
43	0.407	0.494	0.516	17.500
44	0.663	0.903	0.620	16.786
45	0.532	0.764	0.653	17.500
46	0.518	0.442	0.575	19.286
47	0.416	0.520	0.385	21.071
48	0.375	0.472	0.479	21.736

## ITEM 7

## SCALE STATISTICS:

NUMBER OF CASES = 280  
 NUMBER OF VARIABLES = 8  
 MEAN TOTAL SCORE = 4.168  
 STANDARD DEVIATION = 2.618  
 CRONBACH'S ALPHA = 0.930  
 ERROR OF MEASUREMENT = 1.079

## ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
49	0.725	0.931	0.932	22.143
50	0.582	0.754	0.770	23.214
51	0.632	0.831	0.852	23.929
52	0.550	0.750	0.847	27.500
53	0.293	0.406	0.428	27.857
54	0.454	0.632	0.618	28.214
55	0.464	0.647	0.648	28.214
56	0.463	0.640	0.638	27.857

## ITEM 8

## SCALE STATISTICS:

NUMBER OF CASES = 280  
 NUMBER OF VARIABLES = 8  
 MEAN TOTAL SCORE = 2.389  
 STANDARD DEVIATION = 2.222  
 CRONBACH'S ALPHA = 0.744  
 ERROR OF MEASUREMENT = 1.125

## ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
57	0.621	0.879	0.821	29.286
58	0.171	0.244	0.365	29.643
59	0.357	0.518	0.472	31.071
60	0.350	0.539	0.623	35.000
61	0.364	0.545	0.666	33.214
62	0.446	0.668	0.694	33.214
63	0.282	0.454	0.392	37.857
64	0.296	0.474	0.508	37.500



# ITEMS

## SCALE STATISTICS:

NUMBER OF CASES = 280  
 NUMBER OF VARIABLES = 9  
 MEAN TOTAL SCORE = 2.064  
 STANDARD DEVIATION = 2.067  
 CROSBACH'S ALPHA = 0.792  
 ERROR OF MEASUREMENT = 1.030

## ITEM STATISTICS:

ITEM	IPS	ADJ. IPS	N.S. BIS	PERCENT NT
65	0.114	0.194	0.304	41.786
66	0.261	0.442	0.504	41.786
67	0.189	0.340	0.512	44.286
68	0.396	0.706	0.773	45.357
69	0.194	0.372	0.550	47.143
70	0.411	0.772	0.713	46.786
71	0.271	0.517	0.746	47.500
72	0.236	0.449	0.718	47.500

# APPENDIX C

## Intercorrelations between Scales and Total Score

	2	3	4	5	6	7	8	9	10
1	.58	.33	.05	.18	.03	.05	-.01	-.04	.41
2		.50	.14	.24	.05	.15	.03	.00	.51
3			.22	.26	.15	.23	.09	.10	.56
4				.40	.28	.18	.17	.08	.46
5					.47	.41	.30	.24	.68
6						.42	.29	.20	.57
7							.67	.49	.73
8								.65	.64
9									.54